Lasswitz, of Breslau, contributes an article on the decay of the "kinetic atomic theory" in the seventeenth century.—Another communication is by Dr. H. Streintz, of Vienna, on torsion-oscillations of wires. It is followed by a paper on resistance in galvanic conductors, by H. Herwig. This paper was accidentally delayed, and should have been published before another one on the same subject, which appeared in Part 1874, No. 9, of these Annals.—The next paper, on fluorescence, by O. Lubarsch, is highly interesting. The author gives an account of elaborate investigations he made on the subject, with special reference to spectrum analysis; his general results seem to show (1) that for each fluorescent substance there are only certain rays of light causing fluorescence; (2) that the colour of the fluorescent light depends on the rays of incidence, and follows Stokes's law; and (3) that the most refrangible fluorescent rays, produced by sunlight, correspond to that place in the spectrum where the liquid shows its maximum of absorption, providing its fluorescence proves a simple one, when examined by prismatic analysis of the linear spectrum. In all three points Mr. Lubarsch differs from Pierre and Lommel, who investigated the subject before him.—On the expansion of mercury after Mr. Regnault's experiments, is a valuable communication from Mr. A. Wüllner.—The remaining papers are: On the influence of the temperature of air on the index of refraction, by M. V. von Lang; and on the oblique passage of rays through lenses with reference to a peculiarity of the crystalline lens, by L. Herman.—Besides these, there is a short note by H. Schneebeli, on Hipp's machine for determining the laws of motion.

Der Naturforscher (Nos. 49–52, Dec. 1874.)—Among the papers in this number we note the following:—On currents and temperatures in the Atlantic Ocean; observations made on board the German corvette *Gazelle*, by the commander Herr von Schleinitz, on a voyage to the Kerguelen Islands.—On carnivorous plants; researches made by Prof. Ferd. Cohn, of Breslau, with European species.—Note on the discovery of a new asteroid, 139, on Oct. 13, 1874, by Mr. J. Palisa, at Pola. It appeared of the 11th magnitude, under R.A. 2h. 7m. 19·39s.; Decl. +7° 29′ 50·7″.—On the native iron of Ovifak, Greenland; discussing the question whether this native iron is of meteoric or terrestrial origin.—On the influence of temperature upon the respiration of plants; researches made by Herren von Wolkoff and Mayer at Heidelberg, showing that the influence is not nearly so great as is generally accepted.—On the formation of urea in the animal organism, by Herr von Knieriem.—On attraction and repulsion by heat and light, by A. Bergner; account of experiments made, which led to different results than those obtained by Mr. Crookes.—On the decrease of intensity in the light of Jupiter's satellites when passing over the planet's disc. This was explained by S. Alexander as resulting from interference and absorption of the rays of light; H. J. Klein now gives a much simpler explanation.—On the inorganic cell and the phenomena of growth in the inorganic world, by M. Traube; giving a purely physical explanation for the origin and growth of the cell.—Besides many smaller notes of scientific interest, the last number contains a detailed account of the sledge journeys made by Oberlieutnant Jul. Payer while in polar regions with the Austrian Polar Expedition.

SOCIETIES AND ACADEMIES

LONDON

Royal Society, Jan. 21.—"On the Origin and Mechanism of Production of the Prismatic (or columnar) Structure of Basalt," by Robert Mallet, C.E., F.R.S., &c.

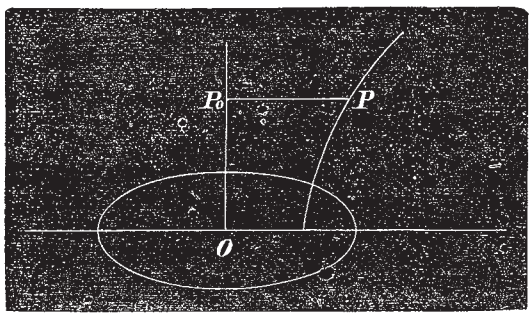
In this paper the author shows that all the salient phenomena of prismatic basalt as observed in nature can be accounted for as results of contraction by cooling in a homogeneous body possessing the properties of basalt, and that the theories hitherto advanced and repeated in text-books of the production of basaltic prisms are alike untenable and unnecessary. If a large level and tabular mass of homogeneous basalt cool slowly by loss of heat from one or more of its surfaces, the contraction of the mass while plastic will be met by internal movements of its particles; but when the temperature has fallen to a certain point of rigidity reached at between 900° and 600° F., splitting up commences, and that surface will begin to divide itself into similar geometric figures of equal area, which on mechanical principles must be hexagons, the diameter of which is shown to depend upon the relation that subsists between the coefficients of extensibility of the material and of its contraction by cooling down to the splitting temperature. These hexagons are the first formed ends of the future prisms, which split deeper into the mass as cooling down to the splitting temperature reaches deeper into it. When the prisms have split down to a certain distance, further cooling proceeds, not only from the ends of the prisms, which formed the surface of original cooling, but from the sides of the prisms. Now, as each prism is coldest at the end, and hottest where in the act of splitting, and is also hotter along the axis than at the exterior of each prism, so, by contraction, differential strains are produced in each prism, both parallel to the axis and transverse to it, which result in cross fractures at intervals along the length of the prism, the distances between which the author has assigned. Transverse fracture round the prism must commence in the outer *couche* in a plane normal to the resultant of the contractile strains longitudinal to and transverse to the axis of the prism; the fracture commences, therefore, oblique to the prismatic axis. This obliquity diminishes as the transverse contractile force diminishes, as the circumferential *couche* of cooling reaches nearer to the axis of the prism; the result is that the transverse fracture when completed is lenticular or cup-shaped, the convex surface always pointing in the same direction in which the cooling is progressing within the mass.

If the mass cool from the top surface only, the convex surfaces of the cup-shaped joints will all point downwards; if cooled from the bottom only, they will point upwards; and if from both surfaces, the convexity of the joints will be found pointing both upwards and downwards in the mass. As the splitting always takes place normal to the surface of cooling, so, if that surface be level and cool, uniformly, the prisms must be vertical and straight; also, if the cooling surface be a vertical or inclined one, the direction of the prisms will be normal thereto. If, however, the mass cool from its upper or lower surface, but of much greater thickness in one direction than in the opposite one, the prisms formed will not be straight, but have their axes curved, because the successive couches reaching the splitting temperature successively within the mass, and normal to which the splitting takes place, are themselves curved planes. These are a few of the principal points of this paper, which the author believes renders, for the first time, a complete and consistent account of all the phenomena observed in prismatic basalt. A considerable number of these phenomena were referred to and explained by the author. At the conclusion of his paper the author submits to rigid examination the notions which from 1804, the period of Mr. Gregory Watts's paper (Phil. Trans.), to the present time, have continued to occupy the text-books of geologists, and he points out how entirely these fail to account for the phenomena.

Linnean Society, Jan. 21.—Dr. G. J. Allman, F.R.S., president, in the chair.—Dr. Hollis read a paper on the pathology of oak-galls. Oak-galls may be divided into two classes, the unilocular or one-celled, which include the woody marbled oak-galls, the ligneous galls of Réaumur, and the currant leaf-galls; and the multilocular or many-celled, including the spongy oak-apple and the oak-spangles of the leaves. The author went with some detail into the structure and history of development of each of these kinds, taking a few examples of each. With the exception of the oak-spangles, all the different kinds appear to be formed during the growth of the leaf. The pathological differs from the healthy development in the more rapid growth of its cellular elements and in the larger size they attain; this is gained at the expense of the differentiation of the matrix of the bud. The author traced the origin of the different layers of the gall itself to the different layers of the leaf from which it is produced. A discussion followed, in which the President, Mr. Murray, Mr. Howard, Prof. Dyer, and others took part.—The following papers were then read:—Reports of the *Challenger* Expedition; On the Lichens, chiefly of Tristan d'Acunha, by the Rev. Dr. Stirton.—On the Lichen Flora of New Zealand and Chatham Island, by the Rev. Dr. Stirton.

Mathematical Society, Jan. 14.—Prof. H. J. S. Smith, F.R.S., president, in the chair.—Mr. J. W. L. Glaisher gave an abstract of a paper by Prof. Cayley, on the potentials of ellipses and circles. The potential of an ellipse of uniform density (in regard to a point not in the plane of the ellipse) was found by a process similar to that made use of in Gauss' memoir, "Determinatio attractionis quam exerceret Planeta," &c. (1818); the final result resembled in a remarkable manner the formula for the potential of an ellipsoid. The author then deduces a

remarkable result relating to the particular case where the attracted point P is in the focal hyperbola of the ellipse, viz.: if we consider the semi-axis minor as constant, but the semi-axis major (and therefore also the focal hyperbola) as variable; and take the point P, always in the focal hyperbola, at a constant altitude above the plane of the ellipse; then the potential remains constant. The potential of the circle is of course included in the general formula for the ellipse, but there are some special



investigations which are developed in detail in the paper.—Mr. Glaisher then proceeded to give a sketch of a second paper by Prof. Cayley, on the attraction of an ellipsoidal shell. The shell in question is the indefinitely thin shell of uniform density included between two similar and similarly situated ellipsoidal surfaces. It was known for a long time that the attraction of such a shell on an internal point was equal to zero; and in 1833 Poisson showed analytically that the attraction on an external point was in the direction of the normal to the confocal ellipsoid through the attracted point, or (what is the same thing) in the direction of the axis of the circumscribed cone having the attracted point for its vertex. In 1834 Steiner gave a very elegant geometrical demonstration of Poisson's theorem, but did not attempt to complete the solution so as to obtain the attraction of the shell. This was done two years ago by Prof. J. C. Adams, F.R.S., who gave the solution at a lecture given in Cambridge. The result (which in the present paper is worked out in a different way) comes out with great simplicity, and we obtain, *without any process of integration*, for the attraction of the shell a finite expression which coincides with known formulæ, and which leads very easily to the known formulæ for the attraction of a solid ellipsoid.—Mr. J. Hammond read a paper on the solution of linear differential equations in series. He first takes the general equation and expands y in a series of determinants, the n arbitrary constants being the first n differential coefficients of y when x is put equal to zero, the particular integral being also expanded in a series of determinants. He then gives expansions of the same form for $\frac{\psi(x)}{\phi(x)}$ and $\frac{1}{\phi(x)}$ and a value of the mth differential coefficient of $\frac{\psi(x)}{\phi(x)}$ in the form of a determinant of $m+1$ rows. And lastly, he considers two particular cases of the expansion of y in series from its differential equation.—Major J. R. Campbell exhibited two "Mechanical Calculators." The instrument is little more than a development of the circular slide scale in which two principles are engaged in one arrangement: (1) that of the common slide scale; (2) that of the scale invented by the late Dr. Roget (see article "Slide Scale," by De Morgan, in the "Penny Cyclopædia.) The designer described the construction and application of the instrument, and having been thanked by the chairman for his communication, presented both instruments (which were constructed with extreme neatness of penmanship) to the Society. Major Campbell also presented his description of the instrument to the Society, containing notes on its manufacture, tables of logarithms, and log-logarithms employed in the construction.—Mr. J. J. Sylvester, F.R.S., made a brief communication on the representation of any unicursal curve and its nodes in terms of the parametric coefficients, and on Roberts' and Hart's cases of unicursal 3-bar motion. M. Camille Jordan spoke on the subject of Mr. Sylvester's communication

Zoological Society, Jan. 19.—Mr. Robert Hudson, F.R.S., vice-president, in the chair.—The Secretary called attention to a letter received from a correspondent in Ternate, Moluccas, in which it was stated that the writer had living examples of four species of Paradise Birds in his possession, namely, of *Paradisea papuana*, *Seleucides alba*, *Diphyllodes speciosa*, and *Ptilorhis magnifica*.—A communication was read from Mr. J. Brazier, of Sydney, N.S.W., giving descriptions of ten new species of Australian shells, from the collection of Mr. A. Coxen, of Brisbane, Queensland.—Mr. A. G. Butler read descriptions of four new species of butterflies of the genus *Protogonius*, belonging to the collection of Mr. H. Druce.—A communication was read from Messrs. P. L. Sclater and O. Salvin, giving descriptions of three new species of South American birds. These were proposed to be called *Microcerculus squamulatus*, *Automolus striaticeps*, and *Tigrisoma salmoni*.—Prof. Newton, F.R.S., gave an account of a MS., in the French Archives de la Marine, which contained some additional evidence as to the original fauna o Rodriguez, and called special attention to the unknown writer's account of the terrestrial birds of that island, amongst which were mentioned the "Solitaire," the *Erythromachus leguati* o A. Milne Edwards, and other now extinct forms.—A communication was read from Dr. A. B. Meyer, director of the Roya Natural History Museum, Dresden, containing the description of a new Bird of Paradise, skins of which had been sent to him by Mr. van Musschenbroek, the Dutch Resident at Ternate, and which it was proposed to call *Diphyllodes Gulielmi* III. The habitat of this new bird is stated to be the inner mountains of Eastern Waigiou.—A communication was read from Major H. H. Godwin-Austen, containing supplementary notes on a former paper on the species of *Helicidæ*, of the sub-genus *Plectopylis*.

Meteorological Society, Jan. 20.—Dr. R. J. Mann, president, in the chair.—After the Report of the Council had been read by the Secretary and adopted, the President delivered his address, in which he dwelt in detail upon the various important and useful measures that had been carried out by the Society during the past year, and in doing so alluded to the action of the Maritime Conference in forwarding uniform and consentaneous operations on the part of meteorologists; the establishment of a uniform system of record, by the combined action of the Society and the Meteorological Office of the Government, which has been adopted by the Army Medical Department; and the starting of a considerable series of authorised and carefully inspected observatories, which have been planned upon a geographical base, so as to give a comprehensive grasp of the meteorology of England, and so as to enable returns to be periodically made which will present at a glance the leading features of climate and season. The value of these stations, it was pointed out, had been very materially increased by a system of concerted action which had been agreed upon between the Meteorological Society and the Meteorological Office of the Government, and which it was intended to extend as the best and most available situations for other observatories could be determined upon. The President next spoke of the large addition that had been made to the usefulness of the Society by the acquisition to its ranks of a considerable number of the most distinguished meteorologists of foreign lands; of the importance of a scientific alliance with the Public Officers of Health, who are now so closely connected with meteorological investigations; of the influence of exceptional seasons upon the health of the community; of investigations in progress with the climate, and especially the winter climate, of London, now of daily importance to some three millions and a half; of systematic observations of the influence of seasons upon animals and plants; of the formation by the Society of a library of standard meteorological works; and of the introduction of close study of the physical condition and aspects of the sun in connection with changes of weather and vicissitudes of season, a subject which is now getting to be of surpassing interest on account of the brilliant discoveries and marvellous deductions that have recently been made in this noble branch of scientific research. The following gentlemen were elected Officers and Council for the ensuing year:—President, Robert James Mann, M.D., F.R.A.S. Vice-Presidents: Charles Brooke, M.A., F.R.S., F.R.C.S., Henry Storks Eaton, M.A., Rogers Field, B.A., Assoc. Inst. C.E., Capt. Henry Toynbee, F.R.A.S. Treasurer, Henry Perigal, F.R.A.S. Trustees: Sir Antonio Brady, F.G.S., Stephen William Silver, F.R.G.S. Secretaries: George James Symons, John W. Tripe, M.D. Foreign Secretary, Robert H. Scott, M.A., F.R.S. Council: Percy Bicknell, Charles O. F. Cator, M.A., Cornelius Benjamin Fox, M.D., Frederic Gaster, William John Harris, M.R.C.S., James Park Harrison, M.A., John Knox Laughton, M.A., F.R.A.S., Robert J. Lecky F.R.A.S., William Carpenter Nash, Rev. Stephen J. Perry, M.A., F.R.S., William Sowerby, E. O. Wildman Whitehouse, F.R.A.S., Assoc. Inst. C.E.

Physical Society, Jan. 16.—Prof. Gladstone, F.R.S., in the chair.—A paper was read on the electrolysis of certain metallic chlorides, by the President and Mr. Alfred Tribe. If metallic copper be immersed in solution of cupric chloride, insoluble cuprous chloride is formed upon it. The authors found that if a strip of platinum be connected with one of copper and the two immersed, the insoluble cuprous salt was also deposited upon the platinum. Attributing this result to the electrolysis of the cupric salt by a feeble current, they tried the effect of a zinc-platinum cell excited by common water and with two platinum electrodes in the cupric chloride. Cuprous chloride appeared at the negative electrode and chlorine at the positive. An ordinary Grove's cell also gave cuprous chloride for the first two or three minutes, but afterwards metallic copper. A zinc and a platinum plate were joined and immersed in the cupric chloride; cuprous chloride was deposited upon the platinum, the edges being also incrusted with metallic copper. With magnesium in place of the zinc, a larger proportion of copper was obtained. Mercuric and ferric chlorides being analogous to those of copper, induced the authors to experiment with them also. Precisely analogous results were obtained, mercurous and ferrous chlorides appearing at the negative electrode.—A communication was made by Prof. Guthrie on "Salt Solutions and attached Water." Continuing the direction of research previously indicated, and the results of which were communicated to the Society in November last, the author described the following facts:—Contrary to the generally received opinion, the minimum temperature attainable by mixing ice with a salt is very independent of the ratio of the two and of their temperature, and of the state of division of the ice. The temperature of a mixture of ice and a salt is as constant and precise as the melting-point of ice. The nine salts resulting from the union of potassium, sodium, and ammonium, on the one hand, and chlorine, bromine, and iodine on the other, were examined in reference to their cryohydrates, the temperatures of the formation of which range from -28 to -11. For the same halogen, sodium salts assume less water than ammonium, and ammonium less than potassium. For the same metal, iodine salts assume less water than bromine, and bromine salts less than chlorine. The result of the examination of thirty-five salts establishes the identity of the temperature at which the cryohydrate is formed with the temperature got by mixing the salt with ice. Only two apparent exceptions to this identity have been as yet observed. The temperature at which a cryohydrate is formed is, with similar salts, lower, according as it assumes a less molecular ratio of water. There appear to be no exceptions to the rule that the lower the temperature got by mixing the salt with ice, the lower the molecular ratio of water. The temperature of incipient solidification of spirits of wine of different strengths was also examined. It was found that from spirits containing more water than the four hydrate, pure ice was separated, and that the temperature gradually sank to $-34°$ C., when the ratio of the four hydrate was reached. Thence the temperature remained constant, and the whole solidified into a hard mass. When a spirit richer than this cryohydrate is cooled, the cryohydrate separates, and a stronger and stronger spirit is left, which ultimately defies the source of cold (solid carbonic acid) to solidify it. Prof. A. Dupré's experiments regarding the maximum temperature produced on diluting alcohol are thus singularly confirmed. For this experimenter showed that this very four molecule ratio produced the greatest heat in its formation. Ethylic ether, which dissolves water and is dissolved by it, seems to form a definite cryohydrate. Water saturated with ether solidifies at $-2°$ C. without separation of ether. The icy mass when ignited burns with a colourless flame, the heat of which just suffices to melt the ice.

PARIS

Academy of Sciences, Jan. 18.—M. M. Fremy in the chair.—The following papers were read:—On the saline matter which the sugar-beet takes up from the soil and from manure, by M. E. Peligot; experiments which the author made with ten specimens of beet, all treated differently with regard to soil and manures, and tables of results obtained when analysing their ashes.—On the temperatures under turf or naked ground during the late frost, by MM. Becquerel and E. Becquerel.—A note by M. de Lesseps, on a project of communication between France and England, by means of a submarine tunnel, with an extract of a detailed account of this project as presented to the French National Assembly. M. Dupuy de Lôme then spoke against this project, and expressed himself in favour of a channel railway ferry.—On the *régime* of the principal rivers in the north, centre, and south of France, by M. Belgrand.—A note on M. Gosselin's paper of the last meeting (see NATURE, vol. xi. p. 240) with regard to unmovable dressings of wounds, by M. Ollier. Baron Larrey then made some further remarks on the subject.—On the first method of Jacobi for the integration of equations with partial derivatives of the first order, by M. G. Darboux.—On a system of tangential co-ordinates, by M. Casey.—On the deposits of flint implements near Précy-sur-Oise, and the presence of great pachydermata in the diluvium of the same locality, by M. E. Robert.—A note by M. de Lontin, on his ameliorations of dynamo-electric machines.—A note by M. Bonneil, on an aëronautical apparatus.—A note by M. E. Duchemin, on a new compass that can be used on the surface of liquids, and gives the time by the sun.—A note by M. C. Beuchot, on the application of steam for canal and river navigation.—On the causes of wear and tear and explosions of steam-boilers, by M. F. Garrigou.—MM. Blandin, Baruzzi, Mosca, and Guillaumont, sent some communications on Phylloxera.—The Minister for Foreign Affairs transmitted to the Academy some documents received from the French Consul at Mauritius, on the results obtained by Lord Lindsay in the observation of the transit of Venus. The French Consul at Honolulu sent some details on the same subject with regard to observations made by English expeditions at Honolulu, Hawaï, and Kanai.—A letter from the Minister for Agriculture and Commerce, drawing the attention of the Academy to the steps that ought to be taken to prevent the invasion into France of the fly *Doryphora*, which attacks the potato plantations in the United States.—On the notion of general systems of algebraic or transcendent surfaces, deduced from that of *implexes* of surfaces, by M. G. Fouret.—On the stellar system, 61 Cygni, stars physically related, the relative motion of which is not an orbit but rectilinear, by M. Flammarion.—Account of the discovery of asteroid (141), at the Paris Observatory, by M. P. Henry.—On the ammonia in the atmosphere, by M. A. Schloesing.—Researches by M. Müntz, on the respiratory functions of fungi.—On the decomposition of Fehling's liquor, and the admixture of glucose in the presence of sugar, by MM. P. Champion and H. Pellet.—On the pulsations of the heart, by M. Marey.—On the carrying along of air by a steam or air jet, by M. F. de Romilly.—On the phenomena of mineral and organic localisation with animals, and their biological importance, by M. E. Heckel.—On the development of Pteropoda, by M. H. Fol.—The neutralisation of the acidity of chloral hydrate by carbonate of soda retards the coagulation, while it preserves the physiological properties, by M. Oré.—Researches on the silicified plants of Autun and Saint-Etienne, by M. B. Renault, with special reference to the genus Botryopteris.—On the influence of forests upon rivers and the hygrometric state of the atmosphere, by M. L. Fautrat.—On the breaking of vessels by the freezing of water, by M. A. Barthélemy.—During the meeting the Secretary announced the sad loss the Academy had sustained through the death of M. d'Omalius d'Halloy, of Brussels, correspondent of the Academy's Mineralogical Section. M. C. St. Claire-Deville then spoke a few words in memory of the deceased.

CONTENTS